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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/575,798	07/10/2008	Bernd Betz	I431.155.101/ETN 527 PCT/	3901
25281 7590 06/08/2009 DICKE, BILLIG & CZAJA FIFTH STREET TOWERS 100 SOUTH FIFTH STREET, SUITE 2250 MINNEAPOLIS, MN 55402				
EXAMINER YUSHIN, NIKOLAY K				
ART UNIT 2893		PAPER NUMBER		
MAIL DATE 06/08/2009		DELIVERY MODE PAPER		

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

# Office Action Summary

**Application No.**

10/575,798

**Applicant(s)**

BETZ ET AL.

**Examiner**

NIKOLAY YUSHIN

**Art Unit**

2893

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --  
**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 10 June 2008.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 16 -41 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 16 -41 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 13 April 2006 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-8508)
- 4) ☐ Interview Summary (PTO-413)
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: \_\_\_\_\_
- Paper No(s)/Mail Date \_\_\_\_\_

## **DETAILED ACTION**

### ***Oath/Declaration***

The oath/declaration filed on 07/10/2008 is acceptable.

### ***Drawings***

The drawings are objected to under 37 CFR 1.83(a). The drawings must show every feature of the invention specified in the claims. Therefore, the leadframe must be shown or the feature (leadframe) canceled from the claim(s). No new matter should be entered.

Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. The figure or figure number of an amended drawing should not be labeled as "amended." If a drawing figure is to be canceled, the appropriate figure must be removed from the replacement sheet, and where necessary, the remaining figures must be renumbered and appropriate changes made to the brief description of the several views of the drawings for consistency. Additional replacement sheets may be necessary to show the renumbering of the remaining figures. Each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either "Replacement Sheet" or "New Sheet" pursuant to 37 CFR 1.121(d). If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

The drawing Fig. 2 is objected to as failing to comply with 37 CFR 1.84(p)(5) because they do not include the following reference sign(s) mentioned in the description: \*10\* is not

shown in Fig. 2. Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. Each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either "Replacement Sheet" or "New Sheet" pursuant to 37 CFR 1.121(d). If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

The drawing Fig. 1 is objected to as failing to comply with 37 CFR 1.84(p)(5) because they include the following reference character(s) not mentioned in the description: \*6\* is shown in Fig. 1, but not in [0046] that describes Fig. 1. Corrected drawing sheets in compliance with 37 CFR 1.121(d), or amendment to the specification to add the reference character(s) in the description in compliance with 37 CFR 1.121(b) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. Each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either "Replacement Sheet" or "New Sheet" pursuant to 37 CFR 1.121(d). If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

***Claim Rejections - 35 USC § 112***

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claim 41 is are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Regarding claim 41, the word "means" is preceded by the word(s) "for providing and ... having" in an attempt to use a "means" clause to recite a claim element as a means for performing a specified function. However, since no function is specified by the word(s) preceding "means," it is impossible to determine the equivalents of the element, as required by 35 U.S.C. 112, sixth paragraph. See *Ex parte Klumb*, 159 USPQ 694 (Bd. App. 1967).

For purposes of examination, examiner reads claim 41 as:

“41. (New) A leadframe which is intended to be fitted with a semiconductor chip and to be encapsulated with a plastic compound, the leadframe having the following features: a metallic single-piece base body of a leadframe, [means for providing] at least one interlayer which has been applied to the base body and may comprise one or more individual layers, and the interlayer [means] having a surface comprising a matrix of islands of remaining material of substantially uniform height with voids extending between these islands.”

#### ***Claim Rejections - 35 USC § 102***

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(a) the invention was known or used by others in this country, or patented or described in a printed publication in this or a foreign country, before the invention thereof by the applicant for a patent.

Claims 16 – 19 and 21 – 26 are rejected under 35 U.S.C. 102(a) as being anticipated by Abbott, US 2004/0183166.

In re Claim 16, Abbott discloses a process for producing a leadframe configured to be fitted with a semiconductor chip 503 and to be encapsulated with a plastic compound 513 (Fig. 5, [0042]) the process comprising: providing a leadframe 401 (Fig. 4); applying an interlayer (402, 403, 404) attackable by an etchant that comprises one or more individual layers, to the leadframe; and etching into the surface of the interlayer using the etchant ([0038]).

In re Claim 17, Abbott discloses the step of depositing a silver alloy and/or a silver compound and/or nickel for the interlayer by means of chemical or electrodeposition processes ([0035], [0037], [0038]).

In re Claim 18, Abbott discloses the step of applying a silver alloy and/or a silver compound and/or nickel as a coarse deposit for the interlayer ([0035], [0038]).

In re Claim 19, Abbott discloses the step of the interlayer in the form of one or more individual layers (402, 403, 404) each having a uniform composition (Fig. 4, [0038]).

In re Claim 21, Abbott discloses that the application of the interlayer and the etching are both carried out over the entire surface of the leadframe (Fig. 2, [0031]).

In re Claim 22, Abbott discloses that both the application of the interlayer and the etching are carried out selectively at defined locations of the surface of the leadframe (Fig. 4, [0039]).

In re Claim 23, Abbott discloses a process for producing a semiconductor device, comprising: producing a leadframe 401 (Fig. 4) including, providing the leadframe 401, applying an interlayer (402, 403, 404) attackable by an etchant that comprises one or more individual layers, to the leadframe 401, and etching into the surface of the interlayer (402, 403, 404) using

the etchant ([0038]); placing a semiconductor chip 503 (Fig. 5) onto the leadframe 506; and applying a plastic compound 513 as encapsulating housing to the leadframe 506 and semiconductor chip 503 ([0046]).

In re Claim 24, Abbott discloses the step of depositing a silver alloy and/or a silver compound and/or nickel for the interlayer by means of chemical or electrodeposition processes ([0035], [0037], [0038]).

In re Claim 25, Abbott discloses the step of applying a silver alloy and/or a silver compound and nickel as a coarse deposit for the interlayer ([0035], [0038]).

In re Claim 26, Abbott discloses the step of the interlayer in the form of one or more individual layers (402, 403, 404) each having a uniform composition (Fig. 4, [0038]).

***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 20, 27 and 28 are rejected under 35 U.S.C. 103(a) as being unpatentable over Abbott (2004/0183166) in view of Hirota, US 5,597,760.

As explained above with reference to claims 16 and 26, Abbott discloses all limitations of claims 20 and 27 (including that the etching is carried out by selectively etching out at least one of the alloying constituents or the compound components of the silver at the surface of the interlayer, note paragraph [0039]), except for limitation that the etching is effected as grain boundary etching at the surface of the interlayer.

Further, in re Claim 28 (which depends from and incorporates all the limitations of claim 27), Abbott discloses that both the application of the interlayer and the etching are carried out selectively at defined locations of the surface of the leadframe (Fig. 4, [0039]).

The difference between the Applicant's claims 20, 27 and 28 and Abbott's method is that Abbott does not specify that the etching used is grain boundary etching.

Hirota teaches selective grain boundary etching (column 2, line 65).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to substitute Hirota's selective grain boundary etching for the completely unspecified etching method required to perform the method of Abbott. Firstly, Abbott does not teach any etching method at all, leaving it to his readers' knowledge and skill to supply an appropriate etching method. Under these circumstances, it would be natural for one of skill in the art to rely on any known etching method, including Hirota's selective grain boundary etching. Secondly, Hirota suggests (column 3, line 5) that selective grain boundary etching increases layer surface area and therefore enhances layer adhesiveness. Finally, the courts have held (see MPEP 2143, part B) that a substitution of one element for another should be considered obvious when (as is the case here) one can articulate findings that (1) the prior art contained a device (method, product, etc.) which differed from the claimed device by the substitution of some components (step, element, etc.) with other components; (2) the substituted components and their functions were known in the art; and (3) that one of ordinary skill in the art could have substituted one known element for another, and the results of the substitution would have been predictable.

Claims 29-41 are rejected under 35 U.S.C. 103(a) as being unpatentable over Abbott (2004/0183166) in view of Ganesan, US 5,554,569.



Initially, it should be noted that Applicants' only criticism of the Ganesan disclosure is, "The leadframe described in U.S. Pat. No. 5,554,569 can scarcely be produced economically." Application, paragraph [0003]. It should be noted that while evidence of commercial success is a secondary factor in the obviousness, criticizing another's attempts to commercialize the claimed invention (without providing evidence that such criticism is valid, or any evidence that the other has even attempted commercialization) is not. It is also noted that there is no evidence that Applicants were able to commercialize an embodiment of the claimed invention in the thirty months that passed between Applicant's priority date and Applicant's demand for National Stage examination in the U.S.

In re Claim 29, Abbott discloses a leadframe configured to fit with a semiconductor chip 503 (Fig. 5) and to be encapsulated with a plastic compound 513 ([0042]), the leadframe comprising: a metallic single-piece base body 401 (Fig. 4) of a leadframe, at least one interlayer (402, 403, 404) which has been applied to the base body 401 and may comprise one or more individual layers (402, 403, 404), and the interlayer (402, 403, 404) having a surface (top of 403) (Fig. 4, [0038]).

In re Claim 30, Abbott discloses that the interlayer comprises a silver alloy and/or a silver compound and/or nickel ([0038]).

The difference between the Applicant's claims 29 and 30 and Abbott's leadframe is that top surface of Abbott's interlayer is not comprising a matrix of islands of remaining material of substantially uniform height with voids extending between these islands.

Ganesan teaches that the top surface 15 (Fig. 1) of the interlayer 14 of the leadframe 11 not comprising a matrix of islands 31 of remaining material of substantially uniform height with

voids 32 extending between these islands 31 (Fig. 2, column 2, lines 65 – 67, column 3, lines 1 - 6).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to combine teachings of Abbott and Ganesan, and to use the layer surface comprising a matrix of islands and voids for improving interfacial adhesion as suggested by Ganesan (column 1, lines 51 -52).

In re Claim 31, Ganesan specifies the surface roughness as at least  $0.15\text{ }\mu\text{m}$  (column 2, line 47). Ganesan also demonstrates that the surface roughness is a result-effective variable because it affects on the adhesion (column 3, lines 43 -46). It would have been obvious to one of ordinary skill in the art at the time the invention was made to use the specified surface roughness, since it has been held that where the general conditions of a claim are disclosed in the prior art, discovering the optimum or working ranges involves only routine skill in the art. [MPEP, 2144.05; II.B]. In re Antonie, 559 F.2d 618, 195 USPQ 6 (CCPA 1977).

In re Claims 32 – 34, Abbott in view of Ganesan discloses all limitations of claims 32 – 34, including the voids and islands at the surface of the interlayer (Fig. 2 of Ganesan), but except for a values of the mean diameter and width of the voids, as well as the ratio of the surface areas of islands to voids. However, Ganesan specifies the surface roughness as at least  $0.15\text{ }\mu\text{m}$  = 1,500 Angstroms (column 2, line 47) that, we assume, corresponds in a first approximation to the size of voids and islands on the surface. Ganesan also demonstrates that the sizes of voids and islands at the layer surface (through the surface roughness) is a result-effective variable because it affects on the adhesion (column 3, lines 43 -46). It would have been obvious to one of ordinary skill in the art at the time the invention was made to use the specified mean diameter and width

of the voids, as well as the specified ratio of the surface areas of islands to voids, since it has been held that where the general conditions of a claim are disclosed in the prior art, discovering the optimum or working ranges involves only routine skill in the art. [MPEP, 2144.05; II.B]. In *re Antonie*, 559 F.2d 618, 195 USPQ 6 (CCPA 1977).

In *re* Claim 35, Abbott discloses a semiconductor device comprising: a semiconductor chip 503 and having an encapsulation of plastic compound 513; a leadframe 506 which is configured to be fitted with the semiconductor chip 503 and to be encapsulated with the plastic compound 513([0042]), the leadframe comprising a metallic single-piece base body of a leadframe (401, 402, 403, 404) (Fig. 4) , at least one interlayer which has been applied to the base body and may comprise one or more individual layers (401, 402, 403, 404), and the interlayer having a surface (top of 403) ([0038]).

In *re* Claim 36, Abbott discloses that the interlayer comprises a silver alloy and/or a silver compound and/or nickel ([0038]).

The difference between the Applicant's claims 35 and 36 and Abbott's semiconductor device is that top surface of Abbott's interlayer is not comprising a matrix of islands of remaining material of substantially uniform height with voids extending between these islands.

Ganesan teaches that the top surface 15 (Fig. 1) of the interlayer 14 of the leadframe 11 not comprising a matrix of islands 31 of remaining material of substantially uniform height with voids 32 extending between these islands 31 (Fig. 2, column 2, lines 65 – 67, column 3, lines 1 - 6).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to combine teachings of Abbott and Ganesan, and to use the layer surface comprising

a matrix of islands and voids for improving interfacial adhesion as suggested by Ganesan (column 1, lines 51 -52).

In re Claim 37, Ganesan specifies the surface roughness as at least  $0.15\ \mu\text{m}$  (column 2, line 47). Ganesan also demonstrates that the surface roughness is a result-effective variable because it affects on the adhesion (column 3, lines 43 -46). It would have been obvious to one of ordinary skill in the art at the time the invention was made to use the specified surface roughness, since it has been held that where the general conditions of a claim are disclosed in the prior art, discovering the optimum or working ranges involves only routine skill in the art. [MPEP, 2144.05; II.B]. In re Antonie, 559 F.2d 618, 195 USPQ 6 (CCPA 1977).

In re Claims 38 - 40, Abbott in view of Ganesan discloses all limitations of claims 32 - 34, including the voids and islands at the surface of the interlayer (Fig. 2 of Ganesan), but except for a values of the mean diameter and width of the voids, as well as the ratio of the surface areas of islands to voids. However, Ganesan specifies the surface roughness as at least  $0.15\ \mu\text{m}$  (column 2, line 47) that, we assume, corresponds in a first approximation to the size of voids and islands on the surface. Ganesan also demonstrates that the sizes of voids and islands at the layer surface (through the surface roughness) is a result-effective variable because it affects on the adhesion (column 3, lines 43 -46). It would have been obvious to one of ordinary skill in the art at the time the invention was made to use the specified mean diameter and width of the voids, as well as the specified ratio of the surface areas of islands to voids, since it has been held that where the general conditions of a claim are disclosed in the prior art, discovering the optimum or working ranges involves only routine skill in the art. [MPEP, 2144.05; II.B]. In re Antonie, 559 F.2d 618, 195 USPQ 6 (CCPA 1977).

In re Claim 41, Abbott discloses a leadframe which is intended to be fitted with a semiconductor chip 503 (Fig. 5) and to be encapsulated with a plastic compound 513, the leadframe having the following features: a metallic single-piece base body of a leadframe 401, at least one interlayer (402, 403, 404) which has been applied to the base body 401 and may comprise one or more individual layers (402, 403, 404), and the interlayer (402, 403, 404) having a surface (top of 403) ([0038]).

The difference between the Applicant's claim 41 and Abbott's leadframe is that top surface of Abbott's interlayer is not comprising a matrix of islands of remaining material of substantially uniform height with voids extending between these islands.

Ganesan teaches that the top surface 15 (Fig. 1) of the interlayer 14 of the leadframe 11 not comprising a matrix of islands 31 of remaining material of substantially uniform height with voids 32 extending between these islands 31 (Fig. 2, column 2, lines 65 – 67, column 3, lines 1 - 6).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to combine teachings of Abbott and Ganesan, and to use the layer surface comprising a matrix of islands and voids for improving interfacial adhesion as suggested by Ganesan (column 1, lines 51 -52).

### ***Conclusion***

Any inquiry concerning this communication or earlier communications from the examiner should be directed to NIKOLAY YUSHIN whose telephone number is (571)270-7885. The examiner can normally be reached on Monday through Friday from 8 a.m. to 5 p.m. EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Davienne Monbleau can be reached on 571-272-1945. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/NY/  
Examiner, Art Unit 2893

/Thomas L Dickey/  
Primary Examiner, Art Unit 2826